



## The First Four Flights:

Math up!



This lesson plan will allow students to understand the path that led to the Wrights' success on December 17, 1903 by relating the stories of their interest in flying from youth, the growing interest in flight in the late 1890s and the flight experiments that led to their first flights in 1903. The story of their dream to fly will be used as a backdrop for students to solve relevant mathematical problems.

### Objectives

Students will:

- a) Understand the path that led to the Wrights' first four flights on December 17, 1903;
- b) Relate the stories of the Wright brothers' interest in flying from youth, the growing interest in flight in the late 1890s, and the flight experiments that led to their first flights in 1903;
- c) Solve relevant mathematical problems related to the Wright Brothers Flight.

### Background

Wright Brothers National Memorial commemorates two ingenious brothers from Dayton, OH who, in 1900, choose the sparsely populated area known as the Outer Banks to conduct a series of experiments that three years later resulted in the world's first heavier than air, powered, controlled flight. The story of these brothers embodies the American ideal of hard work overcoming all obstacles.

Wilbur and Orville Wright were not just lucky bicycle mechanics, but succeeded because of study and scientific experimentation. Their story is the realization of a dream that had existed for centuries; it is not simply about building the first airplane but rather about how they scientifically solved the problem. It is a story about those who inspired and those who aided the brothers as well as the coastal area of North Carolina before, during, and after the dream came to life.

This lesson will help students understand how the Wright brothers even got to have those famous four flights, and how this changed history forever.

This lesson will use math skills to help students understand the Wrights' truly amazing feat.

**Grade Level:** Fourth Grade

**Grade Subjects:** Mathematics

**Duration:** 45 minutes

**Location:** Classroom

**Group Size:** Up to 36

### Standards:

National Standards for Math:  
4.OA.A.2, 4.OA.A.3

### Further Lesson Plans/Activities:

<http://www.nps.gov/fora/forteachers/>

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### Procedure

I. Do you remember wanting to fly when you were younger? Most children do. The Wrights had an interest in flying in their childhood too. Their father gave them a toy—hold up the picture of the Penaud Flying Toy (or find an image online)—when they were 7 and 11 years old. That toy would be the spark that eventually led to their flights in Kitty Hawk, NC in 1903. This toy eventually broke, but instead of throwing it away, they made more of these and referred to them as bats. Twenty five years later they had four successful flights in a much larger flying machine. Listen so you can tell how long each flight was so you can use that information later. The Wrights had a family that encouraged their dreams—their mom taught them how to build things (she was from a family of carriage makers) and there was a library in the home.

The Wrights had two businesses before they started working with flying machines—a printing business and a bicycle shop. In the late 1890s the Wrights became more and more interested with flight and wrote a letter to the Smithsonian to learn about all the work done up to that point.

They did a study of everyone else's flying machines and reasoned that what was missing in a flying machine was a good way to control the plane. They started working on a means of control—just one of the problems involved in making a plane.

After watching turkey vultures twist their wingtips, they constructed a kite to test out the idea of a flexible wing. It worked!

They started looking for places to fly in a glider and eventually traveled to the Outer Banks of North Carolina (what is now Kill Devil Hills) primarily because of the strong winds that this area provided.

II. They came here in 1900 and after two years were very discouraged (they had some success but they weren't getting as much lift as they thought they should). Wilbur told his brother Orville that "man would not fly in a thousand years" on the train ride home.

They were at the point of giving up, but they didn't—they decided to build a wind tunnel to test out different wing shapes to get better data for their glider.

They designed a new glider in 1902 and went back to the Outer Banks to test it. The new design worked—it generated enough lift. They also solved the control problems on their glider that year too.

III. They went back to Dayton and designed a new machine—a powered aircraft—and came back in 1903. After several problems, they eventually had a test flight on December 14, 1903. Wilbur stalled and crashed. Three days later they flew.

IV. Orville took off into a 27 mph wind and flew for 12 seconds and 120 feet.

V. Next, Wilbur took off and flew 175 feet in the same amount of time.

VI. Orville had the third flight and flew 200 feet in 15 seconds.

The last flight of the day was 852 feet long; Wilbur stayed in the air for 59 seconds.

Those were the first successful airplane flights in world history!

Now, you're going to use those times and distances to learn more about the flights!

VII. Calculate the statistics for each flight

Find the mean, median, mode, and range for the times of the first four flights.

Find the mean, median, mode, and range for the distances of the first four flights.

VIII. Calculate the speed for each flight

Speed = distance ÷ time; compute the speed in feet per second for the first four flights.

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Then adjust each speed to miles per hour.

1. Convert feet into miles (divided by 5,280)
2. Divide seconds to hours (divide by 3,600)
3. Divide the distance in miles by the time in hours
4. This calculates the ground speed of an aircraft (how fast it travels over ground).

IX. Once the students have calculated the speed of the Wright Brothers' plane, compare students' running time to the flight time

1. Measure out the distance of the flights in a straight line, see if students can run faster than the Wright Brothers' plane
  - i. first flight (120 ft, 12 seconds)
  - ii. second flight (175 feet, 12 seconds)
  - iii. third flight (200 feet, 15 seconds)
  - iv. fourth and final flight (852 feet, 59 seconds)

**Assessment**

Students will be able to:

- Find the mean, mode, median, and range of more than three numbers,
- Find the speed of a moving object,
- Multiply and divide numbers found in a word problem.

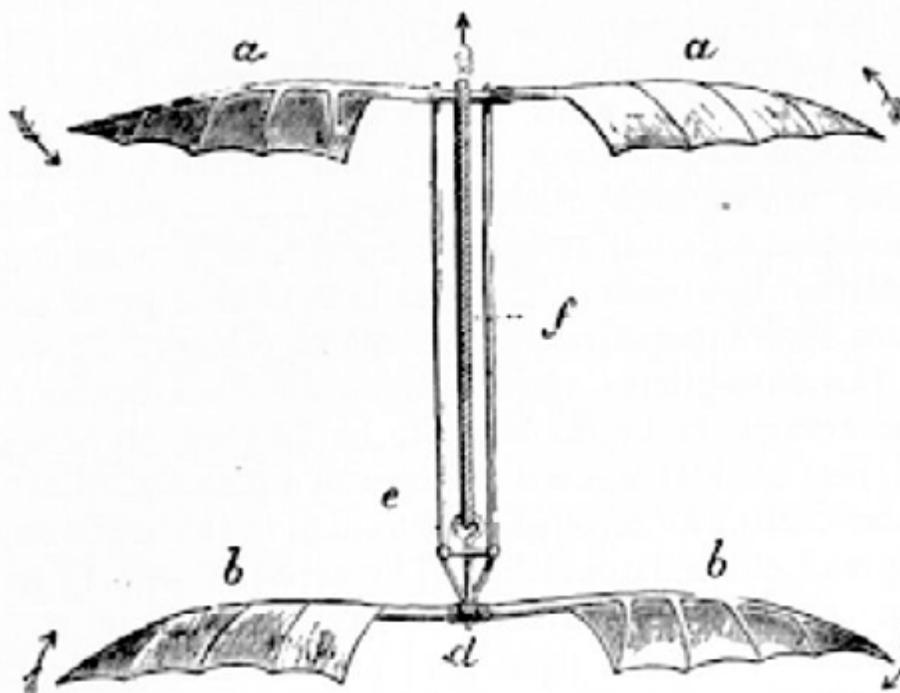
**Materials**

- Images of the Wright Brothers' gliders and 1903 flyer (attached)
- Toy airplane if available
- Image of Penaud Flying Toy

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**Supplementary Resources**

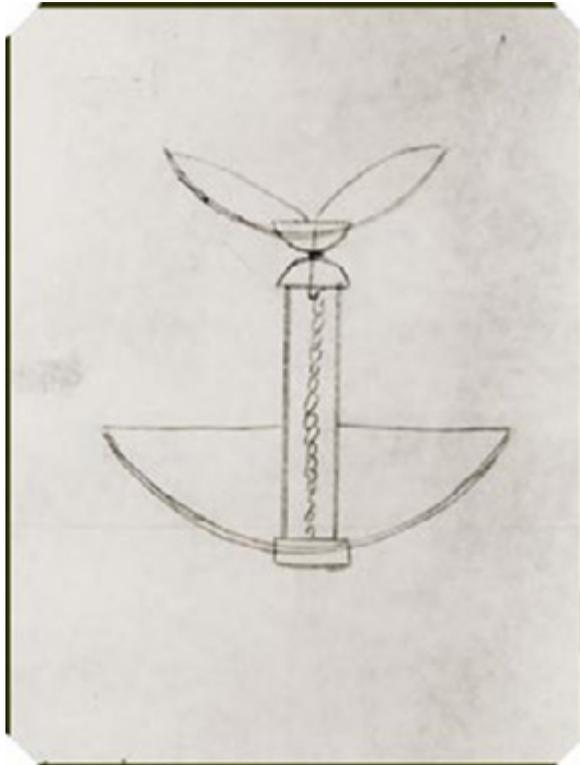
**Penaud Flying Toy**



Penaud Flying Toy, NPS

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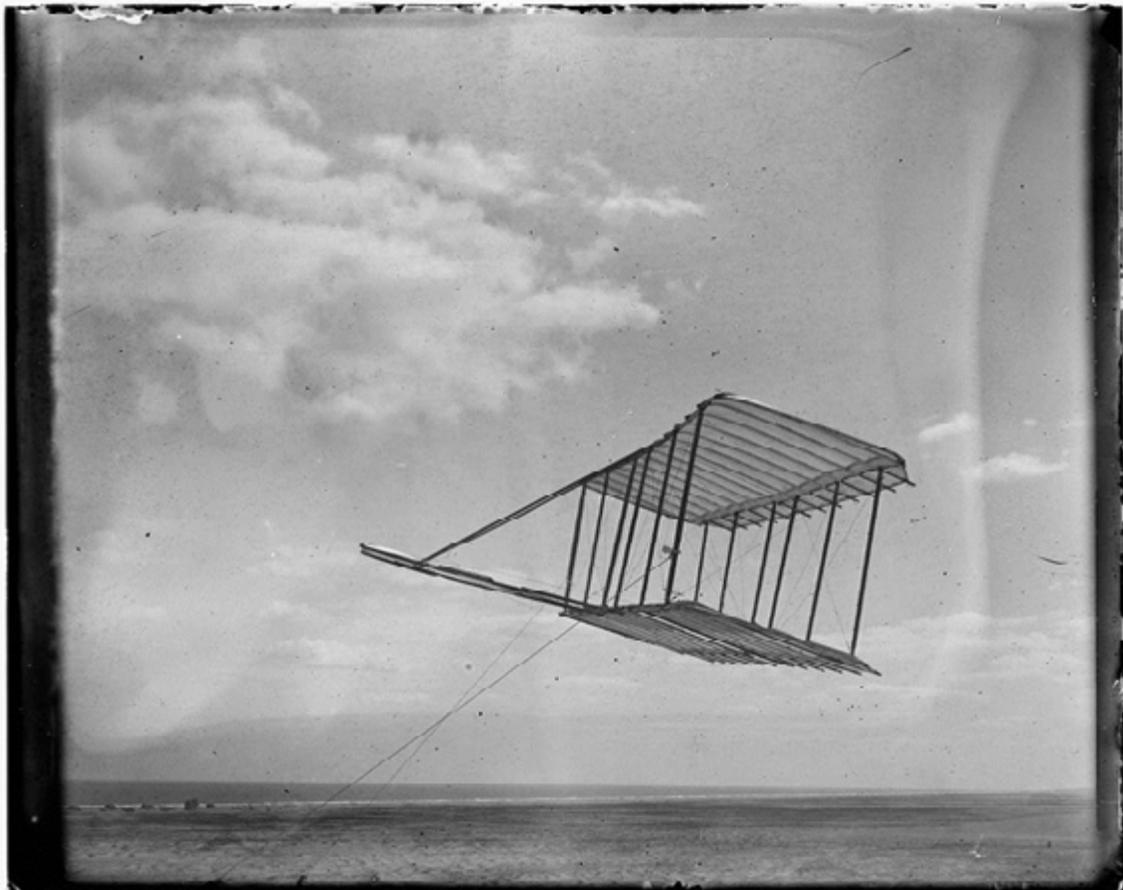
**Penaud Flying Helicopter**



Penaud Flying Helicopter, NPS

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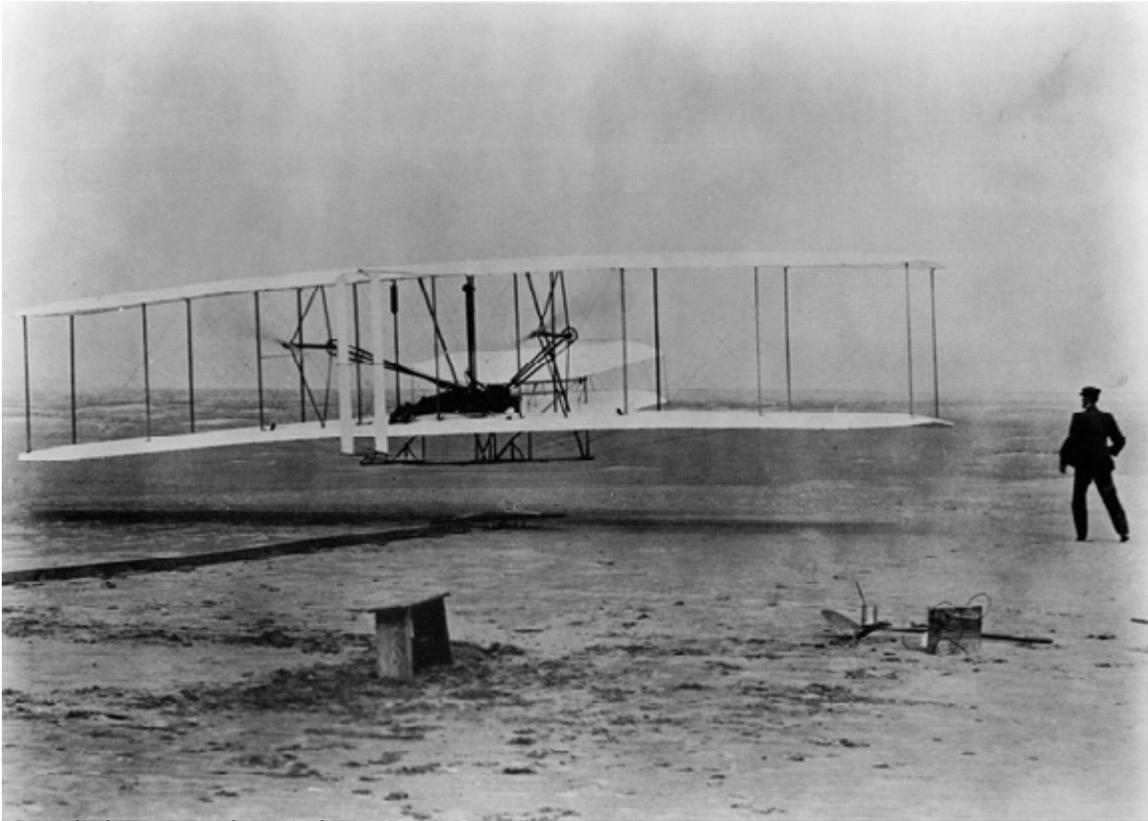
**1900 Flyer Gliding as a Kite**



Flyer Gliding as Kite, NPS

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## 1903 Airplane



First Flight, December 17th, 1903, NPS

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## The First Four Flight Distances of the Wright Brothers



Flight Stones, NPS